

CLAIMS

What is claimed is:

1. A spectrophotometric system, comprising:
an optical grating adapted to disperse in wavelength light received from a sample;
5 one or more photo-detectors adapted to convert dispersed light into electrical signals; and
a movable plate having one or more openings corresponding to one or more spectral features of
a target substance, wherein the movable plate is located between the grating and the one or more
photo-detectors and is adapted to pass light through said one or more openings to said photo-
detectors.
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2. The system of claim 1, wherein the movable plate is adapted to oscillate about a selected
position to vary amount of light passed through the openings.
3. The system of claim 1, wherein, for each opening in the movable plate, the system has at
15 least one photo-detector.
4. The system of claim 1, further comprising a cell containing the sample.
5. The system of claim 1, further comprising:
20 a light source adapted to irradiate the sample; and
a lens adapted to image the light received from the sample onto the movable plate.
6. The system of claim 1, wherein the system is adapted to operate using infrared light.
- 25 7. The system of claim 1, further comprising a signal processor adapted to perform correlation
processing of electrical signals generated by different detectors to determine presence of the target
substance in the sample.
8. The system of claim 7, wherein:
30 the movable plate is adapted to oscillate about a selected position to vary amount of light passed
through the openings; and
the processor is adapted to use lock-in processing to measure one or more ac components of the
electrical signals, said ac components corresponding to the plate oscillation.
- 35 9. The system of claim 1, wherein the movable plate is a part of a MEMS device.

10. The system of claim 9, wherein the MEMS device includes a stationary support structure and one or more springs attached between the plate and the support structure.

5 11. The system of claim 10, wherein the MEMS device further includes an electrostatic actuator adapted to move the plate relative to the stationary support structure in response to an electrical signal applied to the actuator.

10 12. The system of claim 9, wherein the MEMS device is fabricated in a planar wafer and the plate is adapted to move parallel to the plane of the wafer.

13. The system of claim 1, wherein the plate has one or more openings corresponding to one or more spectral features of air.

15 14. The system of claim 1, wherein the plate has openings corresponding to spectral features of a plurality of target substances, wherein a first set of one or more openings corresponds to a first target substance and a second set of one or more openings different from the first set corresponds to a second target substance different from the first target substance.

20 15. The system of claim 1, wherein at least one opening corresponds to an absorption line of the target substance.

16. A method for detecting a target substance, comprising:
dispersing in wavelength light received from a sample;
imaging dispersed light onto a movable plate having one or more openings corresponding to one
25 or more spectral features of the target substance; and
measuring light passing through the one or more openings using one or more photo-detectors.

30 17. The method of claim 16, wherein the movable plate oscillates about a selected position to vary amount of light passing through said openings.

18. The method of claim 17, wherein the plate has one or more openings corresponding to one or more spectral features of air and, when the plate is in the selected position, each of the one or more openings corresponding to air is aligned with a corresponding intensity feature in the dispersed light.

19. The method of claim 17, further comprising applying lock-in processing to measure one or more ac components in electrical signals generated by the one or more photo-detectors, said ac components corresponding to the plate oscillation.

5 20. The method of claim 19, further comprising performing correlation processing of the ac components to detect the target substance.

21. The method of claim 16, wherein the movable plate is a part of a MEMS device including a stationary support structure and one or more springs attached between the plate and the support
10 structure.

22. The method of claim 21, wherein the MEMS device further includes an electrostatic actuator adapted to move the plate relative to the stationary support structure in response to an electrical signal applied to the actuator.
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23. The method of claim 21, wherein the MEMS device is fabricated in a planar wafer and the plate is adapted to move parallel to the plane of the wafer.

24. The method of claim 16, wherein the plate has openings corresponding to spectral features
20 of a plurality of target substances, wherein a first set of one or more openings corresponds to a first target substance and a second set of one or more openings different from the first set corresponds to a second target substance different from the first target substance.

25. A system for detecting a target substance, comprising: }
25 means for dispersing in wavelength light received from a sample;
 means for imaging dispersed light onto a movable plate having one or more openings
 corresponding to one or more spectral features of the target substance; and
 means for measuring light passing through the one or more openings.